



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES UTILITY PATENT APPLICATION FOR

RETROFIT RECESSED FLUORESCENT STRIP FIXTURE AND METHOD

BY

CARLTON PLUNK

# RETROFIT RECESSED FLUORESCENT STRIP FIXTURE AND METHOD

BY

CARLTON PLUNK

5

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to recessed fluorescent strip lighting fixtures. More particularly, this invention relates to a retrofit recessed fluorescent strip fixture which is easily installable from below the plane of the ceiling into existing recessed fluorescent strip lighting fixtures to enable the use of smaller, more efficient, brighter fluorescent light tubes with better color rendering.

### 2. Description of Prior Art

Higher efficiency, brighter fluorescent light tubes with better color rendering are the results of recent development in fluorescent lighting technology. Particularly, these developments have resulted in the availability of T-8 technology tubes with the performance described above. These developments have been of particular interest to large users of recessed strip fluorescent fixtures, such as department, grocery and other retail stores.

Strip fluorescent fixtures are commonly utilized in continuous rows to provide economical uniform lighting of large indoor spaces, such as retail stores. Recessing the fixtures above the plane of the ceiling provides for a 'cleaner' look and

more visual comfort than 'open' strip fixtures. In the past, these fixtures typically utilized T-12 sized tubes in 8 foot lengths. The fixtures themselves typically measured 1 foot by 8 foot and were installed into inverted "T" (NEMA "G") ceiling systems.

Retail stores desire the ability to more efficiently and effectively illuminate their merchandise and their stores by utilizing the newer technology fluorescent light tubes. However, the newer technology tubes cannot be installed into existing strip fixtures as they require different lamp sockets and ballasts.

Replacement of existing fixtures would be very costly, requiring the purchase of completely new fixtures, wiring and construction costs of removing the old fixtures and installing the new fixtures, and, most importantly, the inconvenience and cost of closing down sections of the store as the construction proceeds creating a "hard hat area".

#### SUMMARY OF THE INVENTION

Thus, it is an object of the present invention to provide an economical retrofit recessed fluorescent strip fixture using T-8 technology tubes installable from below the plane of the ceiling into and utilizing the housing of older strip fixtures using T-12 sized tubes.

It is also an object of the present invention that the retrofit fixture utilize the wiring from the old fixture.

It is another object of the present invention that the retrofit fixture be easily installable by one person in a relatively short period of time without the use of fasteners or tools.

5 It is a further object of the present invention to provide a fixture that may be shipped and installed with lamps already in their sockets to further reduce installation time.

These and other objects are achieved through the use of a retrofit fixture which is installable into an existing recessed  
10 fluorescent strip fixture in an inverted T-bar grid ceiling. The retrofit fixture has a reflector sized to fit within the existing fixture and within a grid opening in the ceiling. Flanges are located along the longitudinal edges of the retrofit fixture, with one flange further having hangar tabs extending from its  
15 ends.

By making the reflector flexible about its longitudinal axis, the width of the reflector and the flanges may be reduced to an amount less than the width of the ceiling opening for installation, but return to a width where the flanges cooperate  
20 with the ceiling members to support the retrofit fixture within the existing fixture.

Lamp holders may be in a staggered arrangement on the reflector to support lamps having a combined length greater than the length of the ceiling opening.

25

All of the above outlined objectives are to be understood as exemplary only and many more objectives of the invention may be gleaned from the disclosure herein. Therefore, no limiting interpretation of the objectives noted are to be understood without further reading of the entire specification and drawings included herewith

#### DESCRIPTION OF THE DRAWINGS

Figure 1 shows a bottom view of a T-8 retrofit recessed fluorescent strip fixture of the present invention installed in a ceiling and old recessed fixture.

Figure 2 shows a perspective view of a T-12 recessed fluorescent strip fixture with the T-12 tubes and ballast cover removed.

Figure 3 shows a bottom view of a T-8 retrofit recessed fluorescent strip fixture of the present invention.

Figure 4 shows an end view of the fixture of Figure 3.

Figure 5 shows a perspective view of a T-8 retrofit recessed fluorescent strip fixture of the present invention hanging from a "T" bar ceiling grid under a T-12 recessed fluorescent strip fixture.

Figure 6 shows a detail perspective view of the wiring of a T-8 retrofit recessed fluorescent strip fixture of the present invention to the wiring of a T-12 recessed fluorescent strip fixture.

Figure 7 is an illustration of the step of swinging a T-8 retrofit recessed fluorescent strip fixture of the present invention into position.

Figure 8 shows a sectional view of the fixture taken along the line 8-8 of Figure 1.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Figure 1, the retrofit recessed fluorescent strip fixture of the preferred embodiment has a low profile reflector 10 which, when installed, is recessed above the plane of the ceiling. The ceiling plane is defined by an inverted "T" (NEMA "G") ceiling system having "T" bars 12 in a grid pattern.

Also shown in Figure 1, the fixture of the preferred embodiment has 2 pairs of T-8 size fluorescent tubes 14, 16 and 18, 20, with each tube being one-half the length of the T-12 size tubes of the old fixture. In a typical 1 foot by 8 foot unit, the "T" bars 12 at the end of the fixture will be spaced 96 inches on-center  $L_c$ , with the length of the support portion of the "T" bar  $W_b$  being 1 inch wide. Thus, the width of the opening between the end "T" bars  $L_o$  is 95 inches. Further, any retrofit fixture installable from below the plane of the ceiling into the existing recessed fixture must have a length less than the width of the opening  $L_o$ .

The length of an 8 foot T-8 tube assembly, including the lamp holders, is approximately 96 inches. Since the tubes of fluorescent strip fixtures by design are parallel to the sides of the fixture, it is not possible to utilize an 96 inch tube

assembly in the 95 inch opening  $L_0$  available from below the plane of the ceiling.

The preferred embodiment, shown in Figure 1, overcomes this limitation through the use of pairs of 48 inch T-8 tubes 14, 16 and 18, 20, held by lamp holders 32 and staggered such that the tube assembly ends overlap slightly at the center of the fixture. Thus, the retrofit fixture of the preferred embodiment will fit lengthwise in the 95 inch opening  $L_0$ .

The principles applied with respect to the 1 foot by 8 foot unit of the preferred embodiment apply equally to other common configurations, including 1 foot by 4 foot, and 1 foot by 16 foot configurations.

Installation of the T-8 retrofit fixture of the preferred embodiment into the T-12 fixture is illustrated in Figure 2 through Figure 5. The steps are as follows.

First, power must be disconnected to the T-12 fixture. Then the existing T-12 tubes, and the ballast cover of the T-12 fixture removed, leaving the T-12 lamp holders 22 and T-12 ballast 24 exposed within the T-12 fixture housing 26, as shown in Figure 2.

As shown in Figure 3, the retrofit fixture of the preferred embodiment has hangar tabs 28 extending from flange 30 located along a side edge of the retrofit fixture. Also shown in Figure 3, the retrofit fixture of the present invention may be shipped and installed with the T-8 fluorescent tubes 14, 16, 18, and 20 already installed in T-8 lamp holders 32.

Electronic T-8 ballast 40 is attached to the top side of the reflector 10, as shown in Figure 4.

The next installation step is to hang the retrofit fixture from the "T" bar grid 12 by hangar tabs 28. This can be accomplished by inserting the retrofit fixture side edge having the hangar tabs 28 to the T-12 fixture housing 26 diagonally across the opening in the "T" bar grid until the hangar tabs 28 are above the plane of the ceiling. Then the retrofit fixture can be straightened and pushed to the side, as shown in Figure 5, so that the retrofit fixture will hang from hangar tabs 28 supported by the end "T" bars 12<sub>LE</sub> and 12<sub>RE</sub>.

The hangar tabs 28 can be formed as a short extension of the 22 gauge material utilized for the reflector 10 and flange 30, extending approximately 1/2 inch long and 1/4 in wide. When the fixture is hanging, as shown in Figure 5, the hangar tabs 28 will be in shear, adequately supporting the weight of the retrofit fixture while the one-man installer makes the following wiring connections.

As shown in Figure 6, power supply leads 42 can be cut from the T-12 ballast 24 and attached to the power supply leads 44 from the T-8 ballast 40. Fixture and ballast grounds 46 from the T-12 and T-8 fixtures and ballasts can also be cut and attached.

As shown in Figures 7 and 8, after the wiring connections are complete, the installer may then swing the retrofit fixture up into place transferring the weight of the fixture from the hangar tabs 28 to the flange 30 supported by the side "T" bar



12<sub>RS</sub> as it is slid under the flange 48 of the T-12 fixture. The retrofit fixture reflector 10 may then be flexed just enough to slide flange 30' along the other side edge of the retrofit fixture between flange 48' of the T-12 fixture and the other side "T" bar.12<sub>LS</sub>.

As shown in Figure 8 the depth of the older T-12 fixture housing 26 allows the low profile reflector 10 of the T-8 retrofit fixture, along with T-8 ballast 40, T-8 lamp holders 32 and T-8 fluorescent tubes 14, 16, 18 and 20 to be installed into the T-12 fixture, utilizing the T-12 fixture as its housing. This installation can be accomplished by one person from below the plane of the ceiling within a 5 - 8 minute time frame per unit. Because the T-12 fixture does not have to be removed, the retrofit can be accomplished with minimal disruption and expense.

This detailed description, and particularly the detailed measurements and component descriptions of the preferred embodiment, is given primarily for clearness of understanding and no unnecessary limitations are to be understood therefrom for modifications will become obvious to those skilled in the art upon reading this disclosure and may be made without departing from the spirit of the present invention.